Detection of Trace Heavy Metals in Water: Development of Electrochemical Sensors

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Abstract

The presence of heavy metals in our ecosystem poses significant ecological and physiological consequences. As a result, numerous techniques are developed for the detection of contaminants in aqueous solutions. However, early and trace detection of such contaminants still remains a challenge. Amongst many techniques, electrochemistry driven sensors have shown promise due to their possibility of miniaturization and low-cost. Our research investigates the use of electrically conducting polymer and atomically thin carbon materials as electrodes towards the development of electrochemical sensor. Nanocomposite electrode films have been synthesized and fabricated using in-situ polymerization technique and the relationship between number of cycles of deposition and its electrochemical performance is analyzed. Capacitive microcomb sensor device has been fabricated. Understanding of device performance using electrochemical, chemical, and morphological tests on electrodes will be conducted and generation of ohmic and non-ohmic resistance as a function of deposition, electrolyte solutions will be highlighted. Future work on fabrication of nanofibers using electrospinning and selective deposition on sensor platform will also be discussed.